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Contradictions in Irish Academic Research

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ABSTRACT

The conditions that govern academic research vary greatly from country to country and research in the Republic of Ireland was and remains markedly different from that of its larger European neighbours and the United States. Despite the quality of its education system and the excellent reputation of its universities, until recently Ireland had relatively low levels of academic research. Pinnacles of excellence could be found in certain disciplines, but state funding was low and issues relating to industrial collaborations, international partnerships, commercialisation and the exploitation of Intellectual Property (IP) rarely arose. Even today the Irish Government's spending on academic research, though only slightly less than the European average based on GNP, is dwarfed by the Research and Development (R & D) budgets of individual multinational companies. Nonetheless, rapid economic growth has led to a heightened awareness of the need for strategically planned research. The 'Lisbon Objective' proposes to make Europe "the most dynamic knowledge-driven economy in the world by 2010". Consequently research is heavily influenced by this policy and so a range of unfamiliar problems are posed for managers of Irish academic research. Key to successful operational planning and growth is the need to reconcile a number of contradictions at the heart of R & D in Third Level Institutes¹.

RECENT TRENDS IN IRISH ACADEMIC RESEARCH

There are seven universities and fourteen Institutes of Technology (IOT's) in the Republic of Ireland, serving a population of approximately four million. These statistics give only a superficial impression of a complex structure that has evolved over centuries. Four of the universities, University College Dublin, University College Cork, Galway and Maynooth, are in a federation under the heading 'National University of Ireland' (NUI), whilst the University of Dublin (Trinity College), Dublin City University and the University of Limerick are autonomous bodies. Thirteen of the Institutes of Technology were formed from Regional Technical Colleges (RTC's) in the recent past, whilst the Dublin Institute of Technology (DIT) was formally established in 1992 by amalgamating six technology colleges in the city. DIT is the largest third level institution in the state with some twenty-one thousand students, awards its own qualifications up to PhD level and has a student intake that ranges from craft studies to postdoctoral research. A report in 1998ⁱ raised the prospect of DIT becoming a university, but this aspiration has been dampened by recommendations in a recent OECD publicationⁱⁱ.

¹ 'Third Level Institute' is a term used in Ireland to describe any higher education institute

The Department of Education and Science (DES) is responsible for funding research initiatives for the IOT's, working through the Council of Directors of Institutes of Technology. The Council is jointly funded by the DES and the Institutes and enables directors to co-ordinate the work of the Institutes nationally and resources the respective management teams in the discharge of their duties towards their own institutions. Responsibility for funding in the universities is delegated by the DES to the Higher Education Authority (HEA). The universities are represented by the Council of Heads of Irish Universities (CHIU), which promotes the development of university education and research by formulating and pursuing collective policies and programmes.

Unsurprisingly, the level of research in the IOT's, currently at about 6% of the total budget for all higher education providers in the state, has been and still is low. However, an increasing awareness of the need for industry related applied R & D is bringing about a change of ethos throughout the sector. DIT, though independent of the Council of Directors and CHUI, has enjoyed close working relations with Industry throughout its existence. Consequently, until the late nineties there were pockets of research, often of high quality, but not embedded in the culture of the Institute, nor was the research strategically or operationally planned.

In part, the contradictions in Irish academic research are universal and in part have evolved with the changing needs of industry, the economy and the community and are summarised below.

- i) The paradox confronting the major funding bodies, which largely consist of industrial development agencies, is that they have both a responsibility for generating and commercialising indigenous IP while attempting to maintain the levels of research output and quality. This paradox is partially resolved by the establishment of two research councils, the Irish Research Council for Science, Engineering and Technology (IRCSET)ⁱⁱⁱ and the Irish Council for Humanities and Social Sciences (IRCHSS)^{iv} whose remit is to promote fundamental research. However the budget of each is only a small part of the total Government Expenditure on Research and Development (GERD).
- ii) There is a disparity between the missions and policies of the universities and IOT's and the needs of the sectors of industry and commerce that are driving the 'knowledge-based economy'. The universities and IOT's have missions to support regional development. They also have an implied obligation to staff to allow them to retain currency in their disciplines via research and scholarship. A recent government report^v has highlighted the disparity between industrial research requirements and the nature of research in third level institutes. This disparity is in part irreconcilable due to academia's responsibility to staff and students.
- iii) A mismatch exists between the provision of research available in the universities and IOT's and the priorities of the major external funding bodies.
- iv) There is inevitably conflict between the aspirations of individual researchers and the strategies of third level institutes and the goals and targets that emanate from them.

This text examines the issues raised, their impact on the research community and considers policies and actions for addressing the problems posed.

THE NATURE AND SCOPE OF THE MAJOR FUNDING BODIES

Ireland has achieved unprecedented economic growth in the last decade. A dramatic change has resulted from the benefits of European Union (EU) membership, strong ties with the US economy, high standards in education and government policy. The National Development Plan (NDP) 2000 – 2006^{vi} outlined a commitment to scientific research, technological development and innovation. As a consequence two research funding initiatives were established.

The largest of these was Science Foundation Ireland (SFI)^{vii}, founded to support research in two disciplines aligned to research strength and long-term commercial potential. SFI is the state's largest funder of research with an initial fund of €646m devoted to Biotechnology and Information and Communications Technology (ICT). Recently SFI has assumed responsibility for the Basic Research Grant Scheme and its derivative the Research Frontiers Programme^{viii} which provides project funding for broad based basic research activity, though success rates are significantly below international norms. The requirement for R & D is succinctly described in SFI's 'vision'^{ix}:

“Effective research and development require a combination of resources and talents to drive ideas forward rapidly. SFI will, within its strategic remit, seek out and support effective collaborations and partnerships with agencies, institutions and industry in Ireland and around the world that can best advance Ireland's research, technological and economic competitiveness”.

The argument made is irrefutable, yet the narrow concentration of funding precludes many energetic and talented academics from a major source of R & D funds.

Along with this initiative a Programme for Research in Third Level Institutes (PRTL)^x was established that provided €605m in investment for research infrastructure. The initiative was funded at a similar level to SFI though part of the budget was realised from a private foundation.

Enterprise Ireland (EI)^{xi}, an industrial development agency, previously supported academic research, but now is increasingly focussing on industrially relevant research, though its Commercialisation Fund is open to academics to prove commercial concepts and develop products and services.

The European Union (EU) Framework initiatives^{xii} provide the opportunity to participate in large international projects in a wide range of disciplines with multiple European partners. The current framework (VI) makes large funds available for integrated projects and networks of excellence, whilst Framework VII is in the planning phase. The integrated projects are objective-driven multidisciplinary research topics that must have three or more international partners. Networks of excellence are intended to strengthen scientific and technological excellence in a particular research topic on a European scale, have at least six participants and are thus designed specifically to overcome the fragmentation of European research. The large administrative role associated with managing an EU project is a disincentive to many applicants, whilst the rewards for being a minor participant are often seen as not worth the effort of engaging in the process. EU schemes would benefit from

addressing these issues. Also, many proposals are ill-defined at the writing stage, due to the lack of clarity of the roles of individual partners and the planned interaction between partners. Nonetheless, the EU frameworks offer a unique opportunity for Irish institutes to engage in high calibre international research that they can ill-afford to squander.

The Irish Research Councils for Science and Technology and Humanities and Social Sciences (IRCSET and IRCHSS) offer competitive funding for a range of third level schemes including postdoctoral, postgraduate, fellowships and travel programmes. IRCHSS is the only significant provider of funding in the humanities and social sciences.

The Technological Sector Research (TSR)^{xiii} programme is in its fourth year and has three strands. The strands are not open to proposals from the universities. Strand I provides two-year stipends for postgraduate students in any discipline, Strand II is an enterprise development programme and Strand III makes individual awards of up to €300,000 to projects designed to build core research strengths. New starts under the TSR scheme have reduced in the last two years.

Overall, some funding agencies have broad remits but negligible funds whilst the larger funders are narrowly focussed either in commercial research or the two disciplines prioritised by government. The universities, with a tradition of research, more research active staff and well established research management structures are advantaged in the process of obtaining and exploiting research funds. However in a knowledge-driven economy, DIT and the other IOT's are obligated to build and sustain high quality research. The TSR schemes were envisaged to address this issue, but funding is precarious and historical inequalities endure. Research funding may not remain a political priority when the competing demands of other sectors of the education system resonate with the electorate, but government would be wise not to jeopardise economic growth by cutting back research.

Inadequate allocation of overheads seriously undermines Irish academia's ability to build sustainable research. At present there is no common policy on research overheads amongst the major funding bodies; some award no overhead, others do. Likewise, some universities set a standard rate of overhead for research and consultancy but others do not. There is general agreement that ultimately only a full cost recovery (FCR) model will allow academic research to flourish, but Ireland is lagging behind the US and major European research providers in planning its introduction.

ACADEMIC RESEARCH AND THE KNOWLEDGE-BASED ECONOMY

Though funding for research in Ireland has been at an unprecedented level in recent years, concern exists over the disparity in the amount of funding available for Biotech and ICT when compared with other disciplines. In particular, this view has been expressed by the Irish Research Scientists Association (IRSA)^{xiv}.

The necessary change in direction for Irish R & D has been set out in a number of reports and Downey^{xv} in particular articulates this change:

“With Ireland’s traditional competitive advantages being rapidly eroded, a shift must be made from an economy characterised by foreign investment and importation of technology to a situation where research and innovation become important drivers of sustained international competitiveness”.

“Development of the indigenous research capabilities required to enhance knowledge production, improve the quality and relevance of Irish graduates and translate new scientific and technological advances into marketable goods and services is a prerequisite to creating new competitive advantages”.

Yet, third level institutions face problems associated with the limited funding base. Ideally institutes should foster broad based research that engages the majority of academic staff and consequently positively impacts teaching and learning. Additionally, the range of disciplines taught in the institutes and particularly in DIT requires that all aspects of scholarship are afforded equality with research; hence music, fine art, architecture etc. must offer parity of esteem and opportunity to all academics. Despite this obligation, external funding opportunities are concentrated in too narrow a set of disciplines focussing almost exclusively on commercially based research.

In DIT, research and scholarship seeks to enrich Irish society and Ireland’s intellectual capital and staff and students are encouraged and expected to engage in knowledge generation and knowledge dissemination. Research and other scholarship are indispensable to Irish innovation across a broad spectrum of activities, including the development of consultancy and entrepreneurial activities. The Institute’s Strategic Plan^{xvi} sets out seven themes that are encapsulated in its Mission Statement. Three of these themes call for DIT to:

- i) Have strong postgraduate and research arms
- ii) Be closely allied and responsive to Industry
- iii) Be an entrepreneurial institution.

The plan thus recognises the inextricable link between industry and research requiring a transformation of university-industry-government relations^{xvii}. Accordingly, the Institute’s Research and Scholarship Strategy, Industry Strategy and Strategy for Teaching and Learning are compatible and the research ethos reflects close ties with and responsiveness to industry.

A recent report commissioned for SFI^{xviii} indicates the difficulties in supporting industry. It points out that “expectations are high among government officials for stimulation of knowledge-driven economic and regional development from investments in basic research” and “universities and other third level institutions produce knowledge capital that can be used to encourage economic growth, benefit society and reinvest in academic knowledge production”. However, the report found that there is a shortfall in fundamental resources for technology transfer in third level institutions and states that investment is required to establish a robust technology transfer process. It further states that “the size and proximity of Irish third level institutions, their limited resources and the significant investment that successful technology transfer requires are all factors that indicate that the institutes should network and pool their resources”.

The findings of the report indicate that if research in higher education institutes is to meet the needs of industry, more inter-institutional collaboration is required. Also, research carried out jointly with industry, where company employees are enrolled on part-time research programmes, will mitigate a lack of resources within the institutes and strengthen higher education's reputation with employers.

RELATING INSTITUTIONAL AND FUNDING BODY PRIORITIES

The academic strengths of third level institutes must be harnessed to optimise research under the various initiatives. To do so, a range of institutional weaknesses must be addressed. Often the quality of proposal writing is low and rigorous internal evaluation of external funding applications is essential to safeguard the reputation of the host institute, evaluate impact on 'teaching and learning' and ensure compliance with strategic planning. Periodic external reviews of research are a prerequisite for maintaining quality and relevance, yet Ireland does not have the same tradition of external research assessment that is found elsewhere in Europe. Similarly, personal development policies and career structures for researchers are less in evidence in Ireland. To redress existing deficiencies, buying-in of principal investigators of international standing may be necessary to build and maintain research in strategically important disciplines. It is also increasingly recognised that to provide higher education for any subject group, a range of complementary skills is required^{xix,xx}. Each department within an institute will need to create the appropriate balance between 'teaching and learning', research and scholarship that is essential for delivery of its programmes in a research-informed environment. The process must encompass the needs and academic specialisations of staff, the interests of students and the community, the quality of courses and the rate of change of technology.

In the past, recruitment policies have not always been aligned with the requirements of a research-informed academic environment and must in future have a central role in creating a match between staff skills and an institute's research and scholarship needs. Building competence in research and other scholarly activity poses a considerable challenge for third level education as is evidenced by a recent Forfás study^{xxi}. The report drew attention to the problems of encouraging, recruiting and rewarding high quality research staff:

... "there is a lack of career structure for professional researchers in academia that will make it hard for research groups to attract the best international applicants. There are few incentives for researchers to stay active in Ireland. Correcting this will become increasingly important if Ireland is significantly to increase its research capabilities by recruiting strong international researchers".

Self-fulfilment is an important motivation for participating in research so not all academics will choose to engage in it. Those that do will have differing levels of commitment dependent on personal choice, teaching and administration loads and involvement in other forms of scholarship.

Harmonising departmental strategy and targets with those of an institute cannot be achieved by adopting a 'one size fits all' philosophy. The diversity of Ireland's third level provision should be viewed as a unique asset and metrics should reflect this

diversity. Though applied research and consultancy play an important role in driving a knowledge-based economy, the contribution made by pure or basic research should not be undervalued. As anywhere else, basic research provides industry with much needed, highly motivated graduates possessing research and problem solving skills. However, Ireland is too small a state to disperse its research effort and funds widely and there are too many third level institutions to allow duplication in research activity. Since there is no virtue in doing poor quality unoriginal research, inter-institutional and international strategic alliances are essential. Hence, research activity will not be required from every lecturer in higher education, yet a system that gives parity of esteem and opportunity to all academics must be created. The system must carry the expectation that all teachers will be engaged in some form of scholarship. This will require a comprehensive overhaul of structures and conditions in third level institutions and strategic planning in alignment with national, regional and institutional needs. As a consequence, third level providers should demand and play a greater part in influencing government policy on research. Difficult decisions in respect of prioritisation are called for and increasingly multidisciplinary research clusters will develop critical mass leading to pinnacles of excellence that operate across and blur traditional school and department boundaries. In this environment, though all teachers will be supported to engage in research and scholarship, only those with a proven track record and new appointments who exhibit potential to carry out cutting-edge research will be encouraged to acquire external competitive funding. Research disciplines that are not of great strategic importance to the state, for instance Materials Science wherein Ireland does not have indigenous industries, should only be funded as part of international collaborations where Irish researchers have a real contribution to make.

Even so, government policy should be less narrowly focussed on Biotechnology and ICT. The key research initiatives that will fuel the next generation and long-term interests of Irish manufacturing industry and the economy should be determined and planned for.

Increased funding should be made available to allow third level institutions to increase industry interaction, but the lack of a policy framework such as the Bayh-Dole act will mean that conflicting views on translation of discoveries to commerce are not reconciled. Institute procedures for industry interaction must be less discouraging for academics and limited resources for innovation posts and technology transfer must be increased.

Timely reporting of discoveries from principal investigators is needed and the responsibility for reporting should lie with each institute, whilst funding agencies should assume ownership of IP that institutions do not exploit.

CONCLUSION

The future of Irish academic research will depend on building multidisciplinary clusters of top class researchers, working in high quality facilities in niche disciplines.

All research in third level institutions must be subject to rigorous external periodic review. Recruitment policies must meet the needs of research-informed higher

education that serves the knowledge-driven economy. Procedures, contracts and career structures will need to change to create the required balance between ‘teaching and learning, research and industry interaction.

International collaborations will be increasingly important, particularly in disciplines that are unrelated to Irish core industries. Every academic will not undertake research, but scholarship should be required from each academic.

All higher education institutes will ultimately have to adopt a full cost recovery model for overheads if academic research is to be viable and sustainable.

Government focus on research should be widened and an early start in identifying the next generation of research ‘hot topics’ should be made. A policy framework for research and industry interaction must be instigated, whilst greater funding of innovation and technology transfer is urgently required.

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ABOUT THE AUTHORS

Steve Jerrams is Head of Research at the Dublin Institute of Technology (DIT) and has been in higher education for twenty-six years following a career as a senior stress analyst in the gas turbine industry. He has worked in schools, colleges and universities. Steve lectured in Solid Mechanics in Coventry University for twelve years and during this time established a Rubber Research and Technology Unit. He moved to DIT five years ago to build research in the Faculty of Engineering and has been in his present position for the past three years. He has responsibility for research strategy and development, consultancy and intellectual property. Steve maintains his academic interests and continues to supervise PhD research into non-linear materials in collaboration with leading European institutes.

John Donovan is Head of Innovation and Industry Services in the Faculty of Applied Arts. He graduated in 1981 with a BSc (Hons) in Biochemistry and in 1986, completed a PhD in Molecular Genetics. He spent three years as a *Gästewissenschaftler C1* in the Institut für Biochemie at the University of Frankfurt. In 1988, he returned to the UK as a SERC Senior Postdoctoral Research Fellow and in 1991 returned to Ireland as a Senior Scientist in St Luke's Institute of Cancer Research. Between 1994 and 1999, John was the Executive Secretary of the Irish

Research Scientists Association. During this time, lobbying by the IRSA was instrumental in establishing the Science Foundation Ireland Initiative and the Programme for Research in Third Level Institutes. These two initiatives have a combined spend in excess of €1.2b over five years. From 1999 to 2002 John was responsible for Research Support and the Commercialisation of Research outputs in the Limerick Institute of Technology and now holds a similar post in the DIT with responsibility for the Faculty of Applied Arts. John has a particular interest in the role of research in regional economies.